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ABSORPTION METHOD FOR VARIOUS SUBSTANCES

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[There are no amendments to this patent.]

### Claim

Method for realizing the purpose of storing substances or deodorizing by removing substances by means of absorption agents, which is a method to absorb and remove substances to be absorbed in a container by filling, mixed or separately, independent absorption agents in the container, by adhering them to the inner wall of the container, or by adhering the absorbent agents to the surface of a film and inserting the film in the container.

### Detailed explanation of the invention

#### Industrial application field

The invention is applied to a complete deodorizing method or a storage method for diapers or food.

#### Prior art

In the past, when meat was to be sold, the meat was placed in a tray, which was covered with a polyethylene film, etc., and placed in a refrigerator or freezer case to be sold. However, no absorbents, etc. were used for drips, thus, objectives such as storage and absorption could not be fully realized.

Besides, urine in a diaper has been absorbed by high polymer water absorbent polymers, etc. Thus, the odor of ammonia, etc. absorbed with the urine was removed. However, the odor of feces is not removed but remains.

#### Problems to be solved by the invention

Food such as meat and fish is sold in a tray. However, when the shelf life is long, it is necessary to remove drippings retained on the tray to prevent harm in terms of storage or taste. Such trays in the past have not adopted any method to remove meat drippings. Also, the main purpose of moisture-absorbing agents in diapers of the past has been absorption of urine. Thus, urine could be absorbed and the odor of ammonia contained in urine could be secondarily eliminated. However, the odor of feces could not be eliminated.

#### Means to solve the problems

If there was a substance that could concurrently absorb different required substances, it would be ideal. However, such a substance is not available at present. Therefore, imagine

A: An absorbent that mainly and selectively absorbs a and also absorbs b more or less, and

B: An absorbent that mainly and selectively absorbs b and also absorbs a more or less.

Then, when we want to absorb and remove both a and b, if only A is used, A will be first saturated with a, and b will not be absorbed but remain, and will have a harmful effect.

Therefore, if both A and B are used separately or mixed together, even if A is saturated with a, B will absorb b, thus both a and b will be absorbed.

In such a case, as an example, suppose hydrophilic synthetic zeolite 4A is used as A, and hydrophobic active carbon is used as B, the water content and the odors of both urine and feces can be absorbed.

For a tray for fish or meat, if a freshness-keeping agent is adhered to the inner surface, the meat can be prevented from rotting.

Also, if a moisture absorbent and a deodorant are arranged at positions where urine and feces are discharged inside a diaper, which is in contact with the skin, the moisture absorbent for urine absorbs a large quantity of water content, is saturated, and also absorbs the odor of ammonia along with the urine, but does not have enough capacity to also absorb the odor of feces, but since the part [deodorant] for feces is not saturated with urine, it has capacity for absorption, and can absorb the feces odor. In particular, hydrogen sulfide and methyl mercaptan constitute the odor of feces, thus it is difficult to completely suppress the odor only with an ordinary moisture absorbent. Thus, deodorants for these substances need to be mixed in along with the urine absorbent.

#### Function

Now, in a tray for retailing food, the absorbent layer placed on the bottom of the tray absorbs the moisture and meat juices from the food using a moisture-absorbent zeolite. An oxygen absorbent absorbs oxygen and prevents deterioration of the food due to oxidation.

When a user urinates, if there is only one type of moisture absorbent as in the prior art, the urine is first absorbed and the odor is also absorbed at the same time. Thus the urine odor will not be emitted. However, if the user has a bowel movement, since the moisture absorbent is already saturated and cannot absorb any more odor, the odor will be emitted. In the present invention, a deodorant that selectively absorbs the odor of feces, i.e., hydrogen sulfide and methyl mercaptan and an absorbent that selectively absorbs urine are provided mixed together or independently. Therefore, even after urination, the absorbent for feces, which absorbs the odor of feces, still has capacity, thus emission of odor is prevented. Therefore both the water content and the odor of both urine and feces can be removed.

#### Application examples

Next, an application example of the invention will be explained.

### Application Example 1

Figure 1 illustrates an application example of a tray for retailing food. Figure 1 (a) is a cross-sectional view and Figure 1 (b) is a top view.

On the bottom face of the tray, a mixed absorbent (8) comprising a moisture absorbent (3) and an absorbent (3a) of powder is coated to the surface of the tray using an adhesive.

The moisture absorbent (3) can absorb a large quantity of water. However, even if it is saturated, the other absorbent (3a) can absorb other toxic substances, etc., thus the safekeeping of the food can be anticipated.

### Application Example 2

As another application example, an application example is illustrated wherein the method is used for a diaper.

Figure 2 (a) is a top view of a diaper in accordance with the invention, and Figure 2 (b) is a cross-sectional view at X-X of the diaper.

The diaper comprises five layers of paper. In the cavity (14) within the middle of the five layers of paper, both a moisture absorbent and a deodorant are filled mixed or independently. However, mixing after filling is inevitable. When urine is discharged, the moisture absorbent absorbs the ammonia in the urine and the water content. The deodorant handles feces. Therefore, even if the moisture absorbent (11) is saturated with urine, the deodorant (12) absorbs the odor of feces.

### Effect of the invention

As is obvious in the explanation above, the present invention realizes the following remarkable effects:

- 1) Since various substances are selectively and separately absorbed,
- 2) various substances are absorbed almost completely.
- 3) Therefore, for instance, it can almost perfectly absorb both the odor of urine and feces discharged in a diaper.

### Brief description of the figures

Figure 1 (a) is a cross-sectional view of a tray in accordance with the first application example. Figure 1 (b) is a top view of the tray. Figure 2 (a) is a top view of a second application example. Figure 2 (b) is a cross-sectional view at X-X.

Key: 1      Tray  
      2      Film cover

- 3 Moisture absorbent
- 3a Absorbent
- 8 Mixed absorbent
- 9 Paper
- 11 Moisture absorbent
- 12 Deodorant
- 14 Cavity

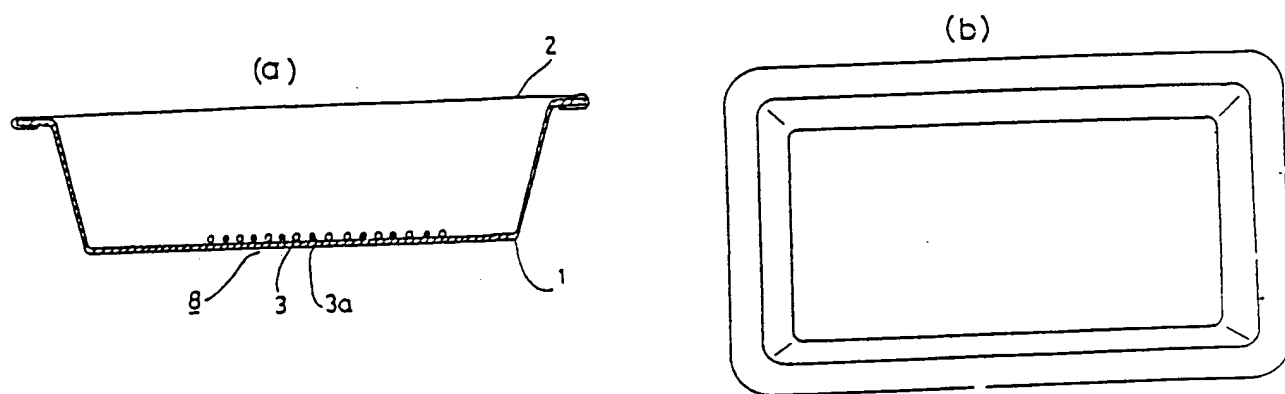


Figure 1

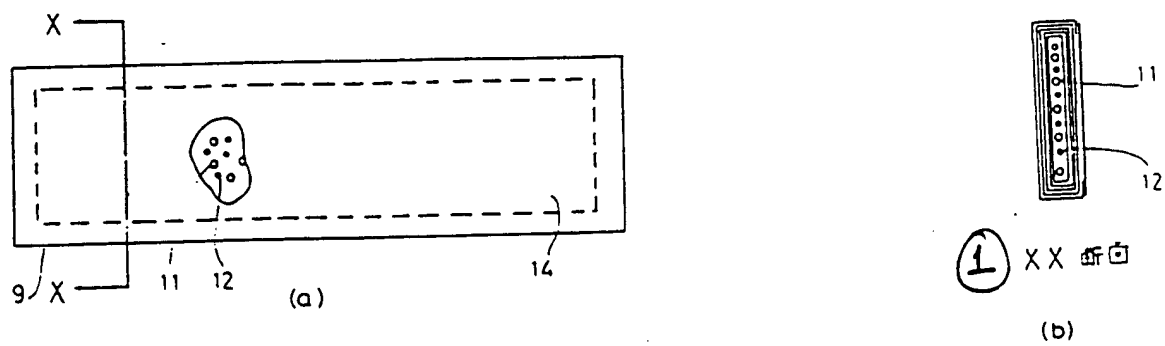


Figure 2

Key: 1 XX cross-section

Total: 100 wt%

### Preparation Example 2

Floral fragrance KM-1120

Benzyl acetate:	4 wt%
Benzyl alcohol:	8 wt%
Linallol:	8 wt%
$\alpha$ -Hexylcinnamic aldehyde:	2 wt%
Terpineol:	1 wt%
Geraniol:	2 wt%
Nonanediol-1,3-diacetate:	0.5 wt%
$\gamma$ -Decalactone:	0.5 wt%
Tetradecanol:	0.5 wt%
Isoeugenol:	2 wt%
Methyl anthranilate:	0.5 wt%
cis-3-Hexanol:	1 wt%
3-Methyl-3-methoxybutanol:	70 wt%
Total:	100 wt%

### Preparation Example 3

Fruity fragrance KM-1100

Methyl 2-methylbutyrate:	2 wt%
Bornyl acetate:	2 wt%
$\gamma$ -Decalactone:	2 wt%
Methyl amyl ketone:	2 wt%
Ethyl benzoate:	3 wt%
Phenylethyl alcohol:	3 wt%
Benzyl acetate:	4 wt%
Ethyl cinnamate:	5 wt%
Ethyl acetate:	5 wt%
Butyric acid:	6 wt%
Ethyl caproate:	6 wt%
Linalool:	8 wt%
$\alpha$ -Terpineol:	8 wt%
Acetaldehyde diamyl acetol:	10 wt%
Ethyl lactate:	14 wt%

Ethyl 2-methylbutyrate:	20 wt%
Total:	100 wt%

### Preparation example

To 10 g each of the citrus fragrance KM-1110, floral fragrance KM-1120, and fruity fragrance KM-1100, which were obtained in the prescription examples, 10 g of 3-methyl-3-methoxybutanol (manufactured by Clara K.K., product name: Sorfite, abbreviated as "Sorfite" below) and 10 g of isoparaffin (manufactured by Clara K.K., product name: IP Sorbent 1620, abbreviated as "IP Sorbent" below) as solvents were added, and respectively carried onto filter paper (8 x 7 cm, thickness of 0.35 mm), 50 g of an ethylene vinyl acetate copolymer pellet, 10 g of 20-30  $\mu$ M calcium silicate (manufactured by Tokuyama Jyuso K.K., product name: Florite R), and about 10 g of felt (8 x 7 x 0.6 cm), which were prepared beforehand as carriers, while stirring if necessary at room temperature, then placed into a sealable glass container as quickly as possible after the preparation and stored at low temperature.

### Production examples

Each kind of carrier supporting 10 g of the fragrance material obtained in the preparation example was sealed into 10 cm long x 8 cm wide bags made by wrapping papers shown in Table 1. They were placed into sealable glass containers as quickly as possible after the preparation and stored at low temperature.

Table 1

① 包装紙 番号	② 原紙の坪量 (g/m <sup>2</sup> )	③ラミネート材と厚さ	④ 加工
1	18	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有 ⑥
2	18	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
3	18	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
4	18	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
5	13.5	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
6	13.5	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
7	13.5	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
8	13.5	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	有
9	13.5	HDPE**1 5 $\mu$ + LDPE**13 $\mu$	無 ⑦
10	37.5	EVA ** (VA:10%) 35 $\mu$	有
11	37.5	(EVA (VA **:10%) + 合成ゴム) 35 $\mu$	有
12	81.7	PE**80 $\mu$ ⑤	無 ⑦

\*1 High-density polyethylene

\*2 Low-density polyethylene



- \*3 Ethylene-vinyl acetate copolymer
- \*4 Vinyl acetate
- \*5 Polyethylene

Key: 1 Wrapping paper number  
 2 Basis weight of the paper material  
 3 Lamination material and thickness  
 4 Viscose processing  
 5 Synthetic rubber  
 6 Yes  
 7 No

#### Reference Example 1

12 kinds of wrapping papers shown in Table 1 were cut into squares with 6-cm sides, p-dichlorobenzene was sealed inside in a specific amount, and 4 sides were heat-sealed. They were stored at room temperature, and the remaining amount of p-dichlorobenzene was measured on the second day. Table 2 shows the results. The remaining amount was indicated by the sublimation amount of p-dichlorobenzene (mg/second day). Also, the wrapping paper numbers are the same as those in Table 1.

Table 2

① 包装紙番号	② パラジクロロベンゼン昇華量 (mg/2日)
1	30.1
2	147.9
3	165.9
4	201.3
5	40.2
6	75.7
7	133.6
8	163.6
9	261.7
10	—
11	—
12	—

Key: 1 Wrapping paper number  
 2 Sublimation amount of p-dichlorobenzene (mg/second day)

### Application Example 1

10 g each of the citrus fragrance KM-1110 (Preparation Example 1), floral fragrance KM-1120 (Preparation Example 2), fruity fragrance KM-1100 (Preparation Example 3), Sorfite, and IP Sorbent was sealed into 8 kinds of wrapping paper with wrapping paper numbers 1-8 shown in Table 1, stored at 40°C for 2 days, and the volatilization amount was measured. Table 3 shows the results.

Table 3

① 包装紙 番号	② 昇華量 (mg/2日)	③ 坪量 (mg/m <sup>2</sup> )	④ 封入した物質					⑤
			⑤ 78-110 系香料	⑥ 78-112 系香料	⑦ シトラス 系香料	⑧ 787-11 系香料	⑨ IP ソルベント	
1	30.1	18	0.92	0.11	0.39	0.02	0.29	
2	147.9	18	2.94	0.17	2.16	0.19	2.05	
3	165.9	18	3.40	0.21	3.03	0.22	2.91	
4	203.1	18	4.39	0.28	6.41	0.27	3.38	
5	40.2	13.5	1.12	0.12	0.39	0.03	0.35	
6	75.7	13.5	1.54	0.14	0.58	0.04	0.95	
7	133.6	13.5	2.82	0.19	2.13	0.19	2.01	
8	163.6	13.5	3.38	0.26	2.49	0.24	2.83	

- Key:
- 1 Wrapping paper number
  - 2 Sublimation amount (mg/second day)
  - 3 Basis weight (mg/m<sup>2</sup>)
  - 4 Material that was sealed
  - 5 Fruity fragrance
  - 6 Floral fragrance
  - 7 Citrus fragrance
  - 8 Sorfite
  - 9 IP Sorbent

As can be clearly observed in Table 3, the volatilization can be controlled by considering the selection of the sublimation amount for the wrapping paper for those that have hydrocarbons, such as the fruity fragrance, citrus fragrance, and IP Sorbent, for example, as main components.

### Application Example 2

10 g of floral fragrance KM-1120 were sealed into each of the 12 kinds of wrapping paper shown in Table 1, placed in a 100-mL beaker, left at room temperature (25°C), and the amount of natural volatilization was measured by measuring the basis weight with a chemical balance per prescribed period. Table 4 shows the results.

Table 4

① 包装纸序号 \ ② 日数	5	10	21	35	63
1	0.06	0.09	0.20	0.31	0.51
2	0.09	0.15	0.27	0.39	0.62
3	0.12	0.19	0.31	0.46	0.67
4	0.15	0.24	0.37	0.51	0.76
5	0.05	0.10	0.20	0.30	0.51
6	0.07	0.12	0.22	0.34	0.56
7	0.10	0.14	0.29	0.42	0.63
8	0.14	0.21	0.34	0.49	0.72
9	0.14	0.17	0.35	0.49	0.74
10	0.21	0.31	0.45	0.61	0.89
11	0.16	0.24	0.37	0.51	0.76
12	0.15	0.21	0.33	0.49	0.73

Key: 1      Wrapping paper number  
 2      Number of days

### Application Example 3

10 g of citrus fragrance KM-1100 were sealed into each of the 12 kinds of wrapping paper shown in Table 1, placed in a 100-mL beaker, left at room temperature (25°C), and the amount of natural volatilization was measured by measuring the basis weight with a chemical balance per prescribed period. Table 5 shows the results.

Table 5

① 包装纸序号 \ 日数 ②	5	10	21	35	63
1	0.11	0.22	0.31	0.55	0.80
2	0.45	0.90	1.71	2.80	4.34
3	0.74	1.40	2.50	3.76	5.72
4	1.32	2.73	5.10	7.30	9.41
5	0.10	0.19	0.37	0.50	0.71
6	0.21	0.30	0.50	0.80	1.33
7	0.43	0.80	1.62	2.61	4.14
8	0.55	1.12	2.00	3.10	4.77
9	1.91	3.57	6.26	8.20	9.70
10	3.71	5.50	8.22	9.77	—
11	3.21	5.06	7.71	9.35	—
12	2.00	3.90	6.54	8.40	9.90

Key: 1      Wrapping paper number  
 2      Number of days

#### Application Example 4

10 g of fruity fragrance KM-1100 were sealed into each of the 12 kinds of wrapping paper shown in Table 1, placed in a 100-mL beaker, left at room temperature (25°C), and the amount of natural volatilization was measured by measuring the basis weight with a chemical balance per prescribed period. Table 6 shows the results.

Table 6

① 包装纸序号 \ ② 日 数	5	10	21	35	63
1	0.38	0.70	1.22	1.78	2.30
2	1.20	2.40	4.29	5.62	7.19
3	1.40	2.71	4.70	6.21	8.06
4	1.87	3.50	5.85	7.63	9.78
5	0.48	0.97	1.56	2.10	2.72
6	0.70	1.30	2.21	2.91	3.81
7	1.10	1.16	3.85	5.40	6.96
8	1.55	2.90	4.87	6.36	8.31
9	1.74	3.30	5.55	7.39	9.50
10	1.75	3.42	5.75	7.55	9.70
11	2.40	3.75	6.60	8.22	—
12	1.20	2.55	4.40	5.83	7.41

Key: 1      Wrapping paper number  
 2      Number of days

### Reference Example 2

10 g of the solvent Sorfite were sealed into each of the 12 kinds of wrapping paper shown in Table 1, placed in a 100-mL beaker, left at room temperature (25°C), and the amount of natural volatilization was measured by measuring the basis weight with a chemical balance per prescribed period. Table 7 shows the results.

Table 7

① 包装纸番号 \ ② 日数	5	10	21	35	63
1	0.02	0.02	0.02	0.03	0.03
2	0.06	0.12	0.19	0.27	0.42
3	0.10	0.16	0.26	0.35	0.55
4	0.10	0.17	0.28	0.39	0.56
5	0.02	0.03	0.03	0.05	0.06
6	0.02	0.03	0.03	0.06	0.07
7	0.06	0.12	0.19	0.27	0.42
8	0.10	0.15	0.24	0.34	0.52
9	0.05	0.12	0.19	0.27	0.42
10	0.12	0.24	0.39	0.52	0.73
11	0.08	0.14	0.22	0.29	0.43
12	0.05	0.12	0.19	0.27	0.42

Key: 1 Wrapping paper number  
 2 Number of days

### Reference Example 3

10 g of the solvent IP Sorbet were sealed into each of the 12 kinds of wrapping paper shown in Table 1, placed in a 100-mL beaker, left at room temperature (25°C), and the amount of natural volatilization was measured by measuring the basis weight with a chemical balance per prescribed period. Table 8 shows the results.

Table 8

① 包装紙番号 \ ② 日数	5	10	21	35	63
1	0.02	0.03	0.25	0.41	0.50
2	0.04	0.14	2.61	4.13	6.80
3	0.09	0.16	3.50	5.32	8.30
4	1.04	0.19	3.75	5.71	8.75
5	0.03	0.05	0.55	0.75	1.18
6	0.04	0.06	1.24	2.05	3.79
7	0.06	0.12	2.42	4.00	6.62
8	0.08	0.17	3.30	5.09	8.11
9	0.06	0.15	3.12	4.87	7.80
10	0.90	1.81	3.65	5.40	8.50
11	1.22	2.41	4.50	6.38	9.34
12	0.06	0.16	3.10	4.78	7.72

Key: 1 Number of wrapping paper  
2 Number of days

#### Application Example 5

10 g each of fruity fragrance KM-1100, prepared in Preparation Example 1, supported on 4 kinds of carriers were sealed in wrapping paper with wrapping paper number 7 shown in Table 1, stored at 40°C, the amount of volatilization (g) was measured. Table 9 shows the results.

Table 9

① 担体 \ ② 日数	2	4	7
③ 濾紙	2.65	4.50	6.35
④ エチレン酢酸ビニル共重合体	2.55	4.40	6.27
⑤ ケイ酸カルシウム	2.60	4.45	6.30
⑥ フェルト	2.62	4.48	6.32
⑦ 無 (そのまま)	2.80	4.70	6.40

Key: 1 Carrier  
2 Number of days  
3 Filter paper  
4 Ethylene-vinyl acetate copolymer  
5 Calcium silicate

- 6 Felt
- 7 None (directly)

As can be clearly observed in the table, the fragrance material can be effectively used in this invention whether or not supported on the carrier.

#### Effect of the invention

The fragrance agent of this invention can manifest the desired gradual releasing property by selecting heat-sealing type viscose-processed paper according to the nature of the fragrance that is used and the purpose of use. Also, in addition to the fact that the fragrance agent of this invention is easy to prepare, the remaining amount can also be confirmed visually when a liquid fragrance material is used. Furthermore, it is easy to carry around. Therefore, it can be effectively utilized in applications such as placing in pockets or placing by pillows, for example, which have not been used formerly in addition to only using indoors.